

WHAT IS CLAIMED AS NEW AND DESIRED TO BE SECURED BY LETTERS
PATENT OF THE UNITED STATES IS:

1. An image forming apparatus, comprising:

a latent image bearing member having a photoconductive surface with a latent image

5 including image areas, at least some of said image areas having different image potential
values thereon; and

a developing device configured to perform a two-level developing operation with a
one-component developer including toner particles, the developing device including,

10 a conveyor member configured to convey the one-component developer from a
one-component developer supply and to deliver the one-component developer with a
predetermined amount of charge to a developing region where a conveyor surface
portion of the conveyor member is closely spaced from and opposed to a
photoconductive surface portion of the latent image bearing member,

15 a thin layer forming device configured to form the one-component developer being
conveyed on the conveyor member into a uniform thin layer prior to the one-component
developer with the predetermined amount of charge being delivered to the developing
region, and

20 a voltage source configured to apply a developing bias voltage to the conveyor
member when the two-level developing operation is performed to move at least some of
the one-component developer with a predetermined charge adhering to the conveyor
surface portion to the photoconductive surface portion to form saturated amounts of the
one-component developer on the image areas of the photoconductive surface portion,
wherein the saturated amounts do not change with increases of the image potential

above a predetermined threshold value to provide an image having a density determined by the saturated amounts.

2. The image forming apparatus according to Claim 1, wherein an amount of the one-component developer adhering to the conveyor surface portion is about 0.5 mg/cm^2 .

5 3. The image forming apparatus according to Claim 1, wherein an absolute value of the predetermined amount of charge of the one-component developer is equal to or less than about $10 \mu\text{C/g}$.

10 4. The image forming apparatus according to Claim 1, wherein substantially all of the one-component developer on the conveyor surface portion is moved during the forming of the saturated amounts.

15 5. The image forming apparatus according to Claim 1, wherein the adhering amount of the one-component developer on the conveyor member is formed by the thin layer forming device to be from 1 to 1.5 times the thickness of a diameter of the toner particles.

20 6. The image forming apparatus according to Claim 5, wherein substantially all of the one-component developer on the conveyor surface portion is moved during the forming of the saturated amounts.

7. The image forming apparatus according to Claim 1, wherein the development region includes a gap between the conveyor surface portion and the opposed photoconductive surface portion that is equal to or less than about $150 \mu\text{m}$.

20 8. The image forming apparatus according to Claim 1, wherein the developing bias voltage applied to the conveyor member by the voltage source is an AC voltage superimposed on a DC voltage, said AC voltage having a peak-to-peak voltage value from 600 to 1200 volts and a frequency from 2 to 6 kHz.

9. The image forming apparatus according to Claim 1, wherein the thin layer forming device protrudes from a holder with a protruding length of 10 to 15 mm.

10. The image forming apparatus according to Claim 1, wherein the thin layer forming device contacts the developer-bearing member with a contact pressure of about 10 to about 5 150 g/cm.

11. The image forming apparatus according to Claim 1, wherein a surface roughness of the conveyor member is set from about 1 to about 4 μm RZ.

12. An image forming apparatus, comprising:
a latent image bearing member having a potential thereon; and
a developing device for performing a two-level developing operation with a one-component developer including toner particles, the developing device including,
a conveyor member configured to convey the one-component developer to a developing region where part of the developer-bearing member is closely spaced next to a part of the latent image bearing member;
a thin layer forming device configured to form the one-component developer on the conveyor member into a uniform thin layer having a height corresponding to 1 to 1.5 times a diameter of the toner particles of the one-component developer.

13. The image forming apparatus according to Claim 8, wherein at least some image areas of a latent image on the latent image bearing member have different potentials and a developing condition is established to insure that an amount of the one-component developer that adheres to the image areas of the latent image bearing member is saturated for all potentials at or exceeding a predetermined threshold potential so that when an image area of the latent image on the latent image bearing member is at the developing region during the

two-level developing operation, substantially all of the one-component developer on the conveyor member that is also at the developing region at the same time is used for the two-level developing operation for forming each saturated amount adhering to the image areas of the latent image.

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14. An image forming apparatus, comprising:

a latent-image bearing member having a photoconductive surface with a latent image including image areas, at least some of said image areas having different image potential values thereon; and

10 a developing device for performing a two-level developing operation with a one-component developer including toner particles, the developing device including,
15 a conveyor member configured to convey the one-component developer from a one-component developer supply to deliver the one-component developer with a predetermined amount of charge to a developing region where the conveyor member is closely spaced from and opposed to the latent image bearing member, and
20 a thin layer forming device to form the developer on the conveyor member into a uniform thin layer,
 wherein an absolute value of the predetermined amount of charge of the one-component developer is equal to or less than about $10 \mu\text{C/g}$.

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15. An image forming apparatus, comprising:

20 means for bearing a latent image including image areas, at least some of said image areas having different image potential values thereon; and
 means for performing a two-level developing operation using a one-component developer including toner particles, the two-level developing operation performing means

including,

means for conveying the one-component developer from a one-component developer supply and to deliver the one-component developer with a predetermined amount of charge to a developing region where a portion of the means for conveying is closely spaced from and opposed to a portion of the means for bearing a latent image,

means for forming a uniform thin layer of the one-component developer on the means for conveying prior to the one-component developer with the predetermined amount of charge being delivered to the developing region, and

means for applying a developing bias voltage to the means for conveying when the two-level developing operation is performed to move at least some of the one-component developer with a predetermined charge adhering to the portion of the means for conveying to the portion of the means for bearing a latent image to form saturated amounts of the one-component developer on the image areas of the portion of the means for bearing a latent image, wherein the saturated amounts do not change with increases of the image potential above a predetermined threshold value to provide an image having a density determined by the saturated amounts.

18 ~~16~~ The image forming apparatus according to Claim ~~15~~¹⁷, wherein an amount of the one-component developer adhering to the means for conveying is about 0.5 mg/cm².

19 ~~18~~ The image forming apparatus according to Claim ~~15~~¹⁷, wherein an absolute value of the predetermined amount of charge of the one-component developer is equal to or less than about 10 μ C/g.

20 ~~18~~ The image forming apparatus according to Claim ~~15~~¹⁷, wherein substantially all of the one-component developer on the portion of the means for conveying is moved during the

forming of the saturated amounts.

12. ~~19~~ The image forming apparatus according to Claim 1, wherein the means for forming the thin layer forms the thin uniform layer of one-component developer on the means for conveying to be from 1 to 1.5 times the thickness of a diameter of the toner.

5 13. ~~20~~ ¹² The image forming apparatus according to Claim ~~19~~, wherein substantially all of the one-component developer on the portion of the means for conveying is moved during the forming of the saturated amounts.

10 21. The image forming apparatus according to Claim 15, wherein the development region includes a gap between the portion of the conveying means and the opposed portion of the means for bearing a latent image that is equal to or less than about 150 μm .

15 22. The image forming apparatus according to Claim 15, wherein means for applying a developing bias voltage to the means for conveying applies an AC voltage superimposed on a DC voltage, said AC voltage having a peak-to-peak voltage value from 600 to 1200 volts and a frequency from 2 to 6 kHz.

23. The image forming apparatus according to Claim 15, wherein the means for forming the uniform thin layer has a portion that protrudes from a holder with a protruding length of 10 to 15 mm.

20 24. The image forming apparatus according to Claim 15, wherein the means for forming the uniform thin layer contacts the means for conveying with a contact pressure of about 10 to about 150 g/cm.

25. The image forming apparatus according to Claim 15, wherein a surface roughness of the means for conveying is set from about 1 to about 4 μm RZ.

26. An image forming apparatus, comprising:

means for bearing a latent image having various potential levels thereon at different image areas; and

means for performing a two-level developing operation using a one-component developer including toner particles, the two-level developing operation performing means including,

means for conveying the one-component developer to a developing region where part of the means for conveying is closely spaced next to the means for bearing a latent image, and

means for forming the one-component developer on the means for conveying into a uniform thin layer having a height corresponding to 1 to 1.5 times a diameter of the toner particles.

27. The image forming apparatus according to Claim 26, wherein a developing condition is established to insure that an amount of the one-component developer that adheres to the image areas of the means for bearing a latent image is saturated for all the various potential levels at or exceeding a predetermined threshold potential level so that when an image area of the latent image on the means for bearing a latent image is at the developing region during the two-level developing operation, substantially all of the one-component developer on the means for conveying that is also at the developing region at the same time is used for the two-level developing operation for forming each saturated amount adhering to the image areas.

28. An image forming apparatus, comprising:

means for bearing a latent image, the latent image including image areas with at least some of said image areas having different image potential values thereon; and

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means for performing a two-level developing operation with a one-component developer including toner particles, the means for performing including,

5 means for conveying the one-component developer from a one-component developer supply to deliver the one-component developer with a predetermined amount of charge to a developing region where a part of the means for conveying is closely spaced from and opposed to a part of the means for bearing a latent image, and

10 means for forming the one-component developer on the means for conveying into a uniform thin layer,

15 wherein an absolute value of the predetermined charge of the one-component developer is equal to or less than about $10 \mu\text{g}$.

20 29. A method for performing a two-level developing operation in an image forming apparatus having a latent image bearing member having a photoconductive surface with a latent image including image areas, at least some of said image areas having different image potential values thereon and a developing device having a conveyor member, comprising the steps of:

25 providing a one-component developer including toner particles;

30 forming the one-component developer into a uniform thin layer on the conveyor member;

35 providing the one-component developer with a predetermined amount of charge and conveying the one-component developer with a predetermined amount of charge to a developing region with the conveyor member so that a conveyor surface portion of the conveyor member is closely spaced from and opposed to a photoconductive surface portion of the latent image bearing member at the developing region;

conveyor member is closely spaced from and opposed to a photoconductive surface portion of the latent image bearing member at the developing region;

- 5 applying a developing bias voltage to the conveyor member and causing at least some of the one-component developer with the predetermined amount of charge adhering to the conveyor surface portion to move to the photoconductive surface portion to form saturated amounts of the one-component developer on the image areas of the photoconductive surface portion, wherein the saturated amounts do not change with increases of the image potential above a predetermined threshold value to provide an image having a predetermined density determined by the saturated amounts.